Energy, Mines and Resources Canada
Énergie, Mines et Ressources Canada

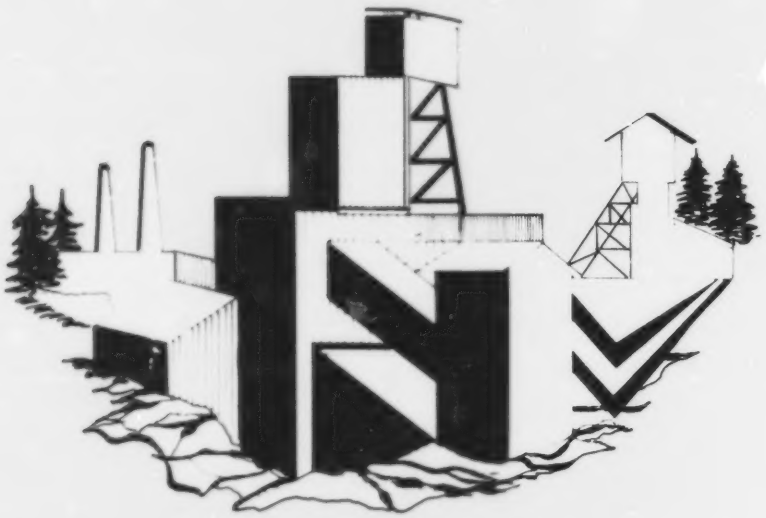
CANMET

Canada Centre for Mineral and Energy Technology
Centre canadien de la technologie des minéraux et de l'énergie

INDEX OF MINERAL PROCESSING PROJECTS

RÉPERTOIRE DE PROJETS SUR LE TRAITEMENT DES MINÉRAUX

1989/1990



MINERAL AND ENERGY TECHNOLOGY MINERAL SCIENCES LABORATORIES

LA TECHNOLOGIE DES MINÉRAUX ET DE L'ÉNERG LABORATOIRE DES SCIENCES MINÉRALES

Energy, Mines and Resources Canada
Énergie, Mines et Ressources Canada

Canada

THE ENERGY OF OUR RESOURCES · THE POWER OF OUR IDEAS

L'ÉNERGIE DE NOS RESSOURCES · NOTRE FORCE CRÉATRICE

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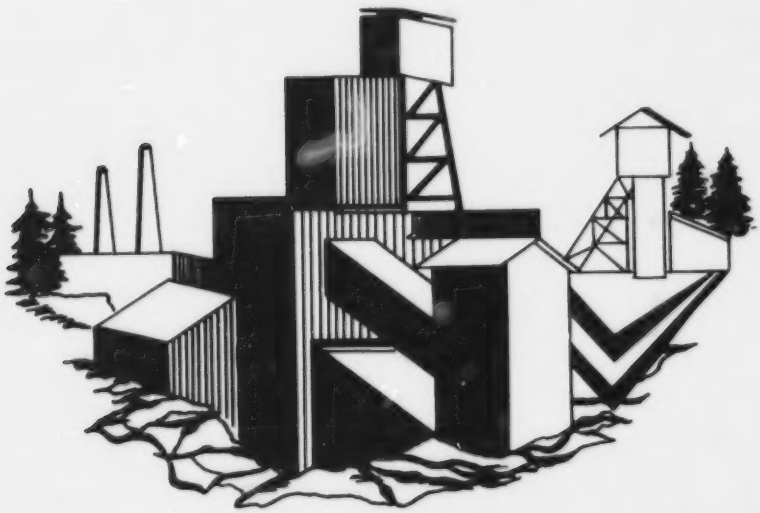

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MINERAL SCIENCES LABORATORIES

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101 pp

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1989/1990

N.D. Loucks and/et D.M. Doyle

Office of Business Development

Bureau du développement commercial

MINERAL AND ENERGY TECHNOLOGY

LA TECHNOLOGIE DES MINERAUX ET DE L'ENERGIE

MINERAL SCIENCES LABORATORIES

LES LABORATOIRES DES SCIENCES MINERALES

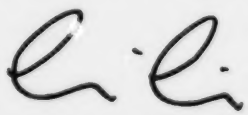
FOREWORD

CANMET has produced this Index of Mineral Processing Projects with the support of the Canadian Mineral Processors (CMP), division of The Canadian Institute of Mining and Metallurgy, the Mining Association of CANADA (MAC) and the Mining Industry Technology Council of Canada Limited (MITEC). This second issue of the Index reflects the work being done in Canada in 1989/90 to develop new or improved technology for the mineral processing sector of the mineral industry. To ensure that the Index is timely and relevant, CANMET intends to up-date it annually. CANMET and its supporting organizations expect that by making this information readily accessible, the exchange of ideas within the mineral processing community would be facilitated and this, in turn, should result in an increased level of technological achievement.

The usefulness of CANMET's Index of Mineral Processing Projects will depend, of course, on the broad participation of the industry in its preparation. This issue of the Index contains projects from fifty-five contributors. It is expected that as the value of the document becomes more evident, more organizations conducting mineral processing research will contribute to its development. CANMET will encourage increased participation through annual solicitation by mail, telephone contacts and site visits.

The Index, in addition to the source, contains a brief title for each project, although for some projects CANMET has limited additional information on file. Anyone interested in a specific project is advised to directly contact the organization concerned. In establishing the database for the Index it was not CANMET's intent to provide detailed information on projects but rather to facilitate contact between parties using the Index.

I thank all those who contributed to this issue of the Index and look forward to their continued support in the preparation of the 1990 Index. I must also acknowledge the work of the authors of this Index and Mr. J.A. Morris of EMR's Informatics Application Division for their work in establishing the methodology and software necessary for the success of this project.



L.L. Sirois
Director
Mineral Science Laboratories

AVANT-PROPOS

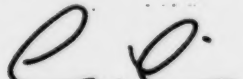
CANMET a été en mesure de publier le présent Répertoire des projets du traitement des minéraux grâce au soutien fourni par la Division des Minéralurgistes du Canada de l'Institut canadien des mines et de la métallurgie (ICM), de l'Association minière du Canada (AMC), et du Conseil canadien de l'industrie sur la technologie (MITEC). Cette deuxième édition du Répertoire reflète le travail qui a été accompli au Canada en 1989/90 en vue de développer des technologies nouvelles ou d'améliorer les techniques existantes au profit du secteur des opérations minéralurgiques de l'industrie minérale. En vue d'assurer la pertinence et l'actualité du Répertoire, CANMET se propose d'en faire la mise à jour annuellement. CANMET et ses organismes de soutien sont d'avis que la disponibilité de cette information facilitera les échanges d'idées au sein du groupe des opérations minéralurgiques ce qui, en retour, pourrait favoriser les réalisations techniques.

Il ne fait aucun doute que le Répertoire des projets du traitement des mineraux préparé par CANMET sera utile dans la mesure où l'industrie participera à sa préparation. Cette publication du Répertoire comprend des projets présentés par cinquante-cinq participants. On s'attend à ce que dès que l'importance du document sera reconnue, les organismes du traitement des minerais participent en plus grand nombre à sa préparation. CANMET s'efforcera de stimuler la participation en joignant les intéressés soit par le biais de lettres, de contacts téléphoniques et en organisant des visites aux installations minières.

On pourra se rendre compte que dans le Répertoire, la source est indiquée et que chaque projet est précédé d'un titre. Cependant, il peut arriver que les dossiers sur certains projets soient peu volumineux; toute personne qui désire plus de renseignements sur un projet spécifique ferait bien d'entrer en contact avec l'organisme responsable. En établissant une base de données en vue de la préparation du présent document, CANMET n'avait pas l'intention de donner une description des projets dans le détail mais plutôt de faciliter les contacts entre les personnes utilisant le Répertoire.

Je profite de l'occasion pour remercier les personnes qui ont participé à la publication de cette édition du Répertoire et je compte sur leur collaboration future pour la préparation du Répertoire de l'année 1990.

Je désire également souligner le travail des auteurs de ce Répertoire, de même que celui de M. J.A. Morris de la Division des applications informatiques à EMR, et remercier ces personnes pour le soin qu'elles ont apporté à l'élaboration de la méthodologie et du logiciel qui étaient essentiels au succès de ce projet.



L.L. Sirois
Directeur
Laboratoires des sciences minérale

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SECTION I - Liste des projets par organisme

INTRODUCTION

This second issue of the Index of Mineral Processing Technology contains projects from various organizations. Although these projects do not represent all of the work being done in Canada to develop new and improved mineral processing technology, the list is, nevertheless, impressive and representative of the current Canadian effort.

The Index consists of two main sections. In Section One the projects are listed by organization while in Section Two they are listed under the operational categories to which they respond. The listing of the organizations in Section One is by geographical region from east to west as defined by the by-laws of the Canadian Mineral Processors. In both Sections One and Two the commodity to which a project relates is given. If a project is being done with no specific commodity in mind the term "general" is used in the commodity column.

Arranging the information contained in the Index in this way permits a person to determine readily work being done by specific performers;

(a) in a specific geographical region;
(b) on a specific commodity;
(c) on a specific operational category;
(d) on any combination of the above.

The project titles are described in whichever of the two official languages they are received. Consequently in searching for work on a specific commodity both the English and French words for that commodity must be used as identifiers. The most common of these combinations are gold/or, copper/cuivre, iron ore/min. de fer, and lead/plomb.

Contributors to the Index of Mineral Processing Technology by so doing have indicated a willingness to discuss their work with other interested parties. The mineral processing community at large is urged to take advantage of this willingness and thus open valuable new lines of communication. In Section One a contact for each organization is given to the right of the organization's name. In some cases, other contacts are listed immediately ahead of the projects for which they are responsible.

INTRODUCTION

Cette deuxième édition de Répertoire des techniques du traitement des minéraux fait état de projets présentés par divers organismes. Ces projets ne représentent qu'une partie des activités effectuées au pays en vue de développer de nouvelles technologies ou d'améliorer les techniques minéralurgiques existantes. La liste en est tout de même impressionnate et témoigne des efforts qui se font actuellement au Canada

Le Répertoire comprend deux sections principales. Dans la première section, les projets sont présentés en fonction des organismes tandis que dans la deuxième section, ils sont classés d'après la catégorie opérationnelle à laquelle ils correspondent. La liste des organismes est présentée dans la première section selon les régions géographiques, de l'est à l'ouest, conformément aux règlements de la Division des Minéralurgistes de Canada. Dans les sections I et II, le produit de base auquel se rattache le projet est indiqué. Si un projet ne porte sur aucun produit de base spécifique, le terme - général - est inscrit dans la colonne où figurent les produits de base. La disposition de l'information dans le répertoire permet à une personne d'obtenir les renseignements suivants sur les travaux exécutés par certains entrepreneurs en particulier;

(a) la région géographique particulière;
(b) le produit de base spécifique;
(c) la catégorie opérationnelle déterminée;
(d) toute combinaison des sujets susmentionnés.

Les titres des projets sont présentés dans la langue officielle dans laquelle ils ont été rédigés. Par conséquent, quand il s'agit de repérer la documentation se rattachant à un produit de base spécifique, les termes français et anglais indiquant le produit doivent être utilisés pour les identifier. Les combinaisons les plus fréquentes sont; or/gold, cuivre/copper, min. de fer/iron ore, et plomb/lead.

Les personnes qui ont participé à la publication du Répertoire des techniques du traitement des mineraux ont démontré une volonté de discuter de leurs travaux avec d'autres parti(e)s intéressé(e)s. Tous ceux et celles qui sont intéressé(e)s au traitement des mineraux devraient s'empresser de tirer profit de ces conditions favorables et de contribuer ainsi à créer de nouvelles voies de communication. Dans la section I, les noms des représentants figurent à la droite des organismes qu'ils représentent. Dans certains cas, les noms d'autres personnes, précèdent immédiatement les titres des projets dont elles sont responsables.

Minéraux Noranda Inc.
Division Mines Gaspé
Murdochville, Quebéc
GOE-1WO

Robin Pelletier
Métallurgiste
(418)784-2541

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Remblayage hydraulique.	14,9,15	cuivre, zinc
2. Colonne de flottation.	6	cuivre, zinc
3. Analyseur en continu.	14,6	cuivre, zinc

Cape Breton Development Corporation
P.O. Box 2500
Sydney, Nova Scotia
B1P-6K9

Bruce Clyburn
Dir. of Process Control & Tech
(902)546-3889

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Application of SPC in coal preparation.	4,5,6,8,14	coal
2. Computerized planned maintenance.	1	coal
3. Low S.G. separation in H.M. cyclones.	4,5,8	coal
4. Freeze - conditioning of coal.	13	coal

Cape Breton Development Corporation
P.O. Box 2500
Sydney, Nova Scotia
B1P-6K9

John C. Campbell
Research Engineer
(902)465-2848

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Improved moisture reduction for Victoria junction fine clean coal.	12	coal
2. Optimization of fine coal dewatering circuit at Victoria Junction coal prep. plant.	12	coal
3. The hydrological study of a large coal stockpile.	16	coal
4. Evaluation of composite of high lime CFBC waste and prep plant coarse waste.	13,16	coal
5. Suitability of N.S. coals as feed for Shell, Texaco, BGC Lurgi and KRW Gasifiers.	16	coal
6. Comparison of channel sample PLY analyses with bulk coal washability.	8	coal
7. Preparation plant recovery performance indicator.	1	coal
8. Limitation of pyrite oxidation and acid formation.	13,15,16	coal
9. Modification of ash fusion temperature.	16	coal

Iron Ore Company of Canada
P.O. Box 1000
Labrador City, Newfoundland
A2V-2L8

John S. Wakeman
Manager Quality Control
(709)944-8303

	PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1.	Grade control.	7,14	iron ore
2.	Iron recovery.	7	iron ore

Wabush Mines
P.O. Box 3000
Wabush, Newfoundland
AOR-1BO

Mr. Peter Cleyle
Plant Metallurgist
(709)285-7302

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Regrind of sprial middlings.	8	iron ore
2. Mill grind control.	14	iron ore
3. Tailings line velocity control.	14	iron ore

Noranda Minerals
Matagami Division
Matagami, Quebec
J0Y-2A0

Claude Ferron
Concentrator Superintendent
(819)739-2511

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Substitution of jaw crusher by rock breaker.	3	copper/zinc
2. Replacement of rods on rod deck screens by rubber panels.	5	copper/zinc
3. Fully automated backfill system.	13	copper/zinc

Selbaie Mines
Box 370
Joutel, Quebec
J0Y-1N0

Pierre LaCombe
Assistant Superintendent
(819)756-2491

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Flotation column testwork.	6	copper, zinc
2. Fotation froth washing.	6	copper, zinc
3. Cu-Zn separation with secondary Cu minerals.	6	copper, zinc
4. Acoustic control of SAG mill operation.	4	copper, zinc
5. ORP as a control variable for Cu-Zn separation.	6	copper, zinc
6. Effect of grinding media shape and composition on grinding efficiency.	4	copper, zinc

Les Explorations Muscocho Ltée.
C.P. 10, Montauban
Comté de Portneuf, Québec

Roger Péloquin
Surintendant du moulin
(418)336-2777

PROJECT TITLE *TITRE DU PROJET*	*CATEGORY* *CATÉGORIE*	*COMMODITY* *MATÉRIEL*
1. *Optimisation de la récupération de l'or et de l'argent d'une nouvelle zone de minerai réfractaire.*	*4,6,8,10*	*l'or, argent*

Les Mines Camchib Inc.
C.P. 3400
Chibougamau, Québec
G8P-2K9

Jacques LeClair
Asst-Surintendant du Con.
(418)748-2625

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Cyanuration du matérial de remblai.	10	l'or

McGill University
3450 University St. Min/Met Engineering
Montreal, Quebec
H3A-2A7

James A. Finch
Professor
(514)398-4351

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Column flotation, mixing.	6	general
2. Column flotation, bias measurement.	6,14	general
3. Column flotation, gas holdup measurement.	6,14	general
4. Column flotation, control.	6,14	general
5. Column flotation, basics.	6	general
6. Electrochemistry, basics.	6	general
7. Electrochemisry, use of N .	6	general
8. Electrochemistry, probe development.	6,14	general

McGill University Min/Met. Engineering
3450 University Street
Montreal,, Quebec
H3A-2A7

McGill University
Professor
(514)398-4351

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Electrochemistry, collectorless flotation	6	general
2. Water recycle, effects	6	general
3. Magnetic - magnetic hydrocyclones column flotation level.	6,7,14	general

Noranda Technology Centre
240 Hymus Blvd.
Pointe Claire, Quebec
H9R-1G5

Ken Stowe
Laboratory Manager
(514)630-9300

	PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1.	Instrumentation for milling operations.	14	general
2.	Advanced process control and modelling.	14	general
3.	Expert systems.	14	general
4.	New grinding technology.	3,4	general
5.	Mineral process development.	6	general
6.	Development of small scale continuous flotation cell.	6	general
7.	Column flotation.	6	general
8.	New flotation technology.	6	general
9.	Water chemistry effects on flotation.	6,15	general
10.	Refactory gold recovery.	4,9,10	gold
11.	TriFlo heavy media separation.	8	general

Mining Industry Technology Council of Canada
809-350 Sparks Street
Ottawa, Ontario
K1R-7S8

W.G. Jeffery
Executive Director
(613)233-9835

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Implementation of process control systems in mineral concentrator	14	gold
2. Knowledge-based automatic control in processing plants (Laval).	14	general
3. Column flotation CANMET-Industry R&D (CANMET).	6	general
4. Activated carbon losses of carbon in pulp circuits (Queen's).	16	gold
5. Iron ore producers real time investigations (CANMET).	14	iron/ore

CANMET
405 Rochester Street
Ottawa, Ontario
K1A-0G1

Marek J. Stefanski
Physical Scientist,Tech. Coord
(613)996-5046

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. To improve iron ore recovery at the Scully Mine, Phase IV.	4,8,14	iron
2. Toxic stabilization and precious metals recovery from process by products and residues at Nerco Con.	4,6,10,15 16	gold
3. Gold recovery improvement investigation at Giant Yellowknife.	4,6,8,10,15 16	gold

CANMET/MSL
552 Booth Street West
Ottawa, Ontario
K1A-0G1

Paul Andrews
Research Scientist
(613)992-8801

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Summary reports, industrial minerals.	16	ind. mineral

CANMET/MSL
555 Booth Street
Ottawa, Ontario
K1A-0G1

J.M.D Wilson
Physical Scientist
(613)992-1394

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Image analysis study of mill products from the spiral of the Quebec Cartier Mining Company.	8	iron ore
2. Mineralogical analysis of the Faro plant.	4,6	copper, zinc
3. Image analysis of products from Faro deposit in Yukon.	6	copper,zinc

CANMET/MSL
555 Booth Street
Ottawa, Ontario
K1A-0G1

William Petruk
Research Scientist
(613)992-1376

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Mineralogical evaluation of ores.	2,4,5,6,7,8 15	general
2. Correlation of mineral liberation to ore characteristics and grinding methods.	4,6	general

CANMET - MSL
552 Booth Street
Ottawa, Ontario
K1A-0G1

Marius A. Cristovici
Research Scientist
(613)992-6430

	PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1.	Improved recovery technology for the treatment of fine particles (tin).	6	tin

CANMET - MSL
552 Booth Street
Ottawa, Ontario
K1A-0G1

Tad Cienski
Senior Metallurgical Engineer
(613)992-5167

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Optimization of column flotation.	6	general
2. Recovery of fine placer gold from sluice box tails.	8	gold

CANMET/MSL
555 Booth Street
Ottawa, Ontario
K1A-0G1

Henry F. Steger
Manager, Chemical Laboratory
(613)992-4105

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Pyrometallurgical CRM's for sulphur.	14,16	sulphur

CANMET-MSL
405 Rochester Street
Ottawa, Ontario
K1A-0G1

Frank Campbell
Manager, Mineral Processing
(613)996-5619

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
D.M. Doyle (613)992-7782		
1. Identification of technology for use by the industrial mineral industry to reduce energy consumption.	4,5,14	ind. min.
2. A study on the potential for heap leaching of placer deposits in the Yukon.	10	gold
3. Optimization of unit operations used in placer mining.	8,11,13,15	gold
D.G. Feasby (613)992-8794		
4. Studies related to asbestos - wet milling, characterization of fibres and bore hole analysis	9,16	asbestos
5. Studies related to the potash industry -dry magnetic and heavy media separation, tailings management & degradation in transit.	7,8,13,15	potash
6. Preparation of a manual on the disposal of tailings from uranium mining operations.	15	uranium
W.H. Cameron (613)992-1123		
7. Production of barium chemicals from barite.	16	barite
8. Development of a method for predicting concentrator performance from characteristics of blast hole cuttings.	16	iron ore

CANMET/MSL
552 Booth Street
Ottawa, Ontario
K1A-0G1

Kwang S. Moon, Phd.
Research Scientist
(613)992-6813

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Flotation process control.	6	copper, zinc
2. Column flotation research Manitoba - MDA program.	6	copper, zinc

Daishowa Chemicals
10 Boul. des Capucins
Quebec, Quebec
G1K-7N1

M.Labbe

(418)525-2727

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Lignosulphonates as depressants in the ore flotation process.	16	general
2. Lignosulphonates as binders for iron ore pelletization.	16	iron ore

Stratmin Graphite Inc.
C.P. 190 chemin du Serpent
Notre Dame Du Laus, Québec
J0X-2H0

(819)767-2221

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Nouveau dépoussiereur.	3	graphite
2. Recouvrir tous les convoyeurs.	3	graphite
3. Installation de tamis dillion.	5	graphite
4. Installation de nouveau centrifuge.	11	graphite

CANMET
555 Booth Street
Ottawa, Ontario
K1A-0G1

M.C. Campbell
Manager, Extractive Metallurgy
(613)996-2929

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Air pollution control-monitoring and control of noxious elements in pyrometallurgical processes.	16	general
2. Non-ferrous smelter technology/development and implementation of improved technology.	16	general
3. Characterization of SO_2 sorbents in fluid bed combustion.	16	general
4. Sensor development for pyrometallurgical processes.	16	general
5. Copper refining technology enhancement.	14,16	Copper
6. Zinc refining technology improvement.	10,11,15,16	Zinc
7. Advanced processes for the treatment of gold ores.	10,14,15,16	gold
8. Evaluation of chloride metallurgy for complex sulphide ores.	10,14,15,16	Pb, Zn
9. Cyanide recovery from gold mill process solutions using AVR.	10	gold
10. Applications of mineral electrochemistry in mineral processing and environmental control.	6,10,14,15	general
11. Biological removal of metal from dilute solutions.	10,11,15,16	general
12. Biological treatment of acid mine drainage.	15	general

cont.

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
13. Biological treatment of industrial effluents for control of metals and organics.	15,16	general
14. Mine environment neutral drainage (MEND).	15	general

CANMET
555 Booth Street
Ottawa, Ontario
K1A-0G1

M.C. Campbell
Manager, Extractive Metllurgy
(613)996-2929

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Water pollution control with zero discharge target and focus on sludge disposal.	10	general

Placer Dome Inc./Detour Lake Mine
130 Wilson Avenue
Timmins, Ontario
P4N-2S9

Peter Dyas
Mill Superintendent
(705)245-3211

	PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1.	Installation and evaluation of a hydrogen peroxide effluent treatment plant.	10	gold
2.	Testing of a Cyanostat for measurement of cyanide quantities in gold/silver leaching solutions.	14	gold
3.	Production of a copper/gold concentrate prior to precious metals leaching.	10	gold
4.	Installation and testing of intank screens as a replacement for external screens in CIP circuits.	10	gold
5.	Testing resins for the extraction of copper from cyanide solutions.	10	gold
6.	Installation and use of an induction furnace to refine steel wool cathodes.	16	10

Laurentian University
Ramsey Lake Road
Sudbury,, Ontario
P3E-2C6

Dr. Laxman Amaratunga
Associate Professor
(705)675-1151

PROJECT TITLE *TITRE DU PROJET*	*CATEGORY* *CATÉGORIE*	*COMMODITY* *MATÉRIEL*
1. *Fundamental reserch - electrokinetic phenomena*	*16*	*general*
2. *Agglomeration of fine mill tailings for back-fill*	*15,16*	*general*

Falconbridge Ltd., Kidd Creek Division
P.O. Box 2002
Timmins, Ontario
P4N-7K1

O. Matwijenko
Technical Superintendent
(705)235-7858

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Copper circuit strategy development.	6,14	Cu, Zn
2. Reagent testing for Zn metallurgy improvements.	6	Cu, Zn
3. 'A' ore Cu circuit configuration testing.	6	Cu, Zn
4. Gold mill flowsheet development.	4,6,8	gold
5. Copper flotation selectivity improvements.	6	Cu, Zn
6. Grinding improvements.	4,14	Cu, Zn
7. Lead rejection.	6	Cu, Zn
8. Column flotation testing.	6	Cu, Zn
9. Concentrator X-ray expert system.	14,16	Cu, Zn
10. 'A' Zn concentrate upgrading.	6	Cu, Zn
11. Kidd ore evaluations.	5,6	Cu, Zn
12. Circuit performance evaluations.	5,6	Cu, Zn
13. Nitrogen conditioning zinc circuit feed.	6	Cu, Zn
14. Flotation NaCN/SO2 control.	6,14,16	Cu, Zn

Falconbridge Ltd., Kidd Creek Division
P.O. Box 2002
Timmins, Ontario
P4N-7K1

O. Matwijenko
Technical Superintendent
(705)235-7858

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Evaluation of Knelson concentrator.	8,13	Cu, Zn
2. Smelter CL slag milling.	4,6,15	Cu, Zn
3. Flotation Ph control.	6,16	Cu, Zn

EIMCO Process Equipment
5155 Creekbank Road
Mississauga, Ontario
L4W-1X2

W.W. Stone
Regional Manager
(416)625-6070

	PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1.	Bio-oxidation of refractory gold ores.	10	gold

Environment Canada/Wastewater Technology
P.O. Box 5050, Physical Chemical Process Sec.
Burlington, Ontario
L7R-4A6

J.W. Schmidt
Section Head
(416)336-4541

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Gold mining effluent treatment.	15	gold
2. Treatment of aqueous effluent from in-situ bitumen heavy oil recovery.	15	oil

Boojum Research Limited
21 Dundas Square
Toronto, Ontario
M5R-1B7

M. Kalin
President
(416)861-1086

PROJECT TITLE *TITRE DU PROJET*	*CATEGORY* *CATÉGORIE*	*COMMODITY* *MATÉRIEL*
1. *Ecological engineering methods for acid mine drainage treatment of coal wastes*	*15*	*general*
2. *Ecological engineering measures developed for acid generating waste the close-out of a decant pond*	*16*	*general*
3. *Biological polishing of mining waste waters: Bioaccumulation by the Characeae*	*16*	*general*

University of Waterloo
200 University Avenue West
Waterloo, Ontario
N2L-3G1

Dr. J.A. Cherry
Professor
(519)885-1211

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Field evaluation of tailings abandonment techniques.	15	general
2. The geochemical evolution of the Delnite Mine tailings.	15	silver
3. The geochemical evolution of the Heath Steele Mine tailings.	15	copper, zinc
4. The geochemistry of the Vadose Zone of the Waite Amulet tailings impoundment, Quebec.	15	copper,zinc
5. The hydrogeology and geochemistry of the Inco Copper Cliff tailings.	15	Cu, Ni

University of Toronto
Dept. of Metallurgy and Material Science
Toronto, Ontario
M5S-1A4

Glenn Dobby
Associate Professor
(416)978-3017

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Flotation froths	6	general
2. Flotation circuit analysis	6	general
3. Aerosol reagent addition	6	general
4. Solution flow in heap leaching	10	general

Noranda Minerals Inc. (GECO Division)
P.O. Box 100
Manitouwadge, Ontario
P0T-2C0

Malcom Dellow
Chief Metallurgist
(826)826-3211

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Pressure filter project.	11,13	Cu,Pb,Zn

Noranda Minerals Inc. (GECO Division)
P.O. Box 100
Manitouwadge, Ontario
P0T-2C0

Graham A. Johnson
Asst. Environmental Engineer
(807)826-3211

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Tailings pipeline replacement.	13,15	Cu,Zn

Westminer Canada Ltée., Mines Chibougamau
C.P. 8000
Chibougamau, Québec
G8P-2L1

Tshitende Kasongo
Surintendant au Con.
(418)748-7691

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Optimisation du circuit de broyage.	4	l'or, cuivre
2. Optimisation de la récupération de l'or flottation et par gravité pour l'or libre.	6,8	l'or, cuivre

Placer Dome Inc. - Campbell Mine
Box 10
Balmertown, Ontario
P0V-1C0

John Frostiak
Mill Superintendent
(807)735-2075

PROJECT TITLE *TITRE DU PROJET*	*CATEGORY* *CATÉGORIE*	*COMMODITY* *MATÉRIEL*
1. Bioleach pilot plant.	*10*	*gold*
2. Flash flotation cell.	*6*	*gold*

MANITOBA

Hudson Bay Mining and Smelting
P.O. Box 1500
Flin Flon, Manitoba
R8A-1N4

J.A. Hillier
Mill Superintendent, Flin Flon
(204)687-2361

	PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1.	Namew Lake mill, new Cu, Ni mine and mill.	2	nickel, Cu
2.	Flash flotation cell.	6	gold
3.	Crusher automation.	3	Zn,Cu,Au
4.	Flin Flon mill modernization, flotation circuit.	2,6	Zn,Cu,Au
5.	Trout Lake ore metallurgy.	2,6,16	Zn,Cu,Au
6.	Bacterial leaching of Flin Flon ore.	10	Zn,Cu,Au
	Les Betteridge (204)687-2372		
7.	Column flotation testing for Cu/Zn separation and Zn Conc upgrading.	6,9	copper, zinc
	Les Betteridge (204)687-2372		
8.	Sala process for the above (hot reverse flotation.)	6,9	copper, zinc
	Les Betteridge (204)687-2372		
9.	Flash cell installation on Callinan ore.	4,6	copper, zinc
	Les Betteridge (204)687-2372		
10.	Modernization of ARL analyzer and associated computer system.	14	copper, zinc

cont.

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
Les Betteridge (204)687-2372		
11. Wemco 300 cells for Mout Lake copper circuit.	16,2	copper, zinc
Les Betteridge (204)687-2372		
12. New circuit (Callinan ore).	2,6,16	copper, zinc

Manitoba Department of Energy and Mines
555-330 Graham Avenue
Winnipeg, Manitoba
R3C-4E3

W.A. Bardswich
Director of Mines
(204)945-6505

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Abandoned sulphide tailings study.	15	general
2. Peat treatment - acid effluent.	15	general
3. Column flotation - copper concentrates.	6	general
4. Slag cleaning study - electric furnace.	2	general
5. Silicon metal production.	9	silica
6. Feasibility study -chromite sensitivity analysis.	2	general
7. Gold recovery bromide process on mill tailings.	15	gold

SASKATCHEWAN

Cameco Mining Division (Key Lake Operations)
2115 - 11th St. West, P.O. Box 2070
Saskatoon, Saskatchewan
S7K-3S7

E. Lam/M. Neven/R. Steane
Senior Metallurgist/Superint.
(306)382-0505

PROJECT TITLE *TITRE DU PROJET*	*CATEGORY* *CATÉGORIE*	*COMMODITY* *MATÉRIEL*
1. *Molybdenum removal circuit (Removal of molybdenum uranium bearing loaded strip solutions.)*	*16*	uranium

SASKATCHEWAN

Department of Energy and Mines
1914 Hamilton Street
Regina, Saskatchewan
S4P-4V4

Philip L. Reeves
Director, Mines Branch
(306)787-7338

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Long term tails management.	15	potash
2. Dry magnetic separation.	7	potash
3. Heavy media separation of potash.	8	potash
4. Dissolution/injection of potash tailings.	15	potash
5. Ion exchange technology.	16	potash
6. Potash product compaction.	16	potash
7. Electrostatic separation.	6	potash
8. Ion chromatograph applications.	16	potash

Melis Engineering Ltd.
519 - 45th Street West
Saskatoon, Saskatchewan
S7L-5Z9

Lawrence A. Melis, P.Eng.
President
(306)652-4084

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Mill commissioning systems.	16	general

Smoky River Coal Ltd.
P.O. Box 2000
Gilante Cache, Alberta
T0E-0Y0

Edgar Hozner
Plant Superintendent
(403)827-3711

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Air sparged hydro-cyclone.	6	coal

Giant Yellowknife Mines Ltd.
Bag 3000
Yellowknife, N.W.T.
X1A-2M2

Gary B. Halverson
Mill Superintendent
(403)873-6301

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Recovery improvements.	16	gold

Echo Bay Mines/Lupin Operations
3300 Manulife Place, 10180, 101 Street
Edmonton, Alberta
T5J-3S4

R. Bruce Ferguson
Processa Engineer
(403)422-8767

PROJECT TITLE *TITRE DU PROJET*	*CATEGORY* *CATÉGORIE*	*COMMODITY* *MATÉRIEL*
1. Recovery enhancement from leach tails	*6*	*gold*

University of Alberta
Mineral Processing
Edmonton, Alberta
T6G-2G6

L.R. Plitt
Professor
(403)432-3454

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Column flotation of coal-modelling and scaleup.	6	coal
2. Cleaning drilling muds with hydrocyclones.	5	coal
3. Co-agglomeration of sulphur adsorbents on coke.	16	coal

Alberta Office of Coal
3rd Floor, Blue Cross Place 10009-108 Street
Edmonton, Alberta
T5J-3C5

R.J.C. McDonald
Chairman
(403)427-8042

	PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
	R.C. MacKenzie (403) 427-8042		
1.	Washery optimization.	8	coal
2.	WESTCOAL separator.	9	coal
3.	Electrocoagulation.	11	coal
4.	Coal beneficiation process.	13,16	coal
5.	Coal agglomeration process development.	13,16	coal
6.	Spontaneous combustion of thermally treated coals.	13,16	coal
7.	Spontaneous combustion of thermally treated coals.	13,16	coal
8.	Agglomeration of coking coal.	13,16	coal

John W. Britton
12652 26A Avenue
White Rock, British Columbia
V4A-2M4

John W. Britton, P.Eng.
Owner/Manager
(604)531-2964

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Refractory gold recovery - modified roasting techniques.	16	gold
2. Chalcopyrite/sphalerite separation - improved reagent development.	6	copper/zinc

Nerco Con Mine Ltd.
P.O. Box 2000
Yellowknife, Yukon
X1A-2N1

Chris J. Martin
Operations Engineer
(403)920-4597

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Treatment of refractory ores.	6,10,16	gold
2. Recovery of gold from Con Mill tailings.	6,10,15	gold
3. Treatment of roaster calcine residues.	6,10,16	gold
4. Arsenic-bearing sludge stabilization.	16	gold
5. Development of methods to recover gold from low grade ores.	10,16	gold
6. Grinding circuit optimization.	4	gold
7. Metallurgical accounting computerization.	4	gold

Fording Coal Ltd., Fording River Operation
P.O. Box 100
Elkford, British Columbia

J.D. Andrusiak
Superintendent, Processing
(604)865-2271

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Secondary fines dewatering sieve bends.	5	coal
2. Heavy media cyclone circuit expansion.	8	coal

Cominco Ltd./Cominco Research
P.O. Box 2000
Trail, British Columbia
V1R-4S4

M.J. Fairweather
Group Leader, Mineral Treat.
(604)364-4447

	PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1.	Column cell research - critical control variables.	6	lead/zinc
2.	Column cell research - applied mineralogy.	6	lead/zinc
3.	Column cell research, fine sulphide separation.	6	lead/zinc
4.	Grinding, classification modelling.	4	lead/zinc
5.	Column cell scale-up.	6	lead/zinc
6.	Flotation of complex ores.	6	lead/zinc
7.	Beneficiation of complex, refractory gold ores.	6,8	lead/zinc

Equity Silver Mines Ltd.
P.O. Box 1450
Houston, British Columbia
V0J-1Z0

Robert Sloan
Operating Metallurgist
(604)845-7799

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Reprocessing of mill tailings.	15	gold,silver
2. Neutralization of acid mine drainage by tube-milling of limestone.	16	gold,silver

Coal Mining Research Company
P.O. Bag 1400, One Oil Patch Drive
Devon, Alberta
T0C-1E0

Stanley G. Butcher
Vice Pres. & Tech. Director
(403)987-8181

PROJECT TITLE *TITRE DU PROJET*	*CATEGORY* *CATÉGORIE*	*COMMODITY* *MATÉRIEL*
1. *Drying of synthetic materials.*	*12*	*coal*
2. *Fine coal technology assessment.*	*8,9,11,15*	*coal*
3. *Westcoal separator.*	*8*	*coal*
4. *Hydrosizer for fine coal recovery.*	*8*	*coal*
5. *Coal characterization - cleaning potential.*	*8,5*	*coal*
6. *Coal stabilization.*	*12,16*	*coal*
7. *Segregation in drying.*	*12*	*coal*
8. *Auto-sampler assessment.*	*14*	*coal*
9. *Coal beneficiation process.*	*16*	*coal*

Cominco Ltd., Sullivan Concentrator
P.O. Box 2000
Kimberley, British Columbia
V1A-2G3

R.S. Simkus
Manager
(604)427-3577

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Column flotation.	6,14	lead, zinc
2. Grinding circuit study.	4,5	lead, zinc
3. Fine grained lead/zinc.	6	lead, zinc
4. X-ray analysis.	14,16	lead, zinc
5. Computer system replacement.	6,8,14	lead, zinc

Noranda Minerals Inc. Bell Mine
P.O. Box 2000
Granisle, British Columbia
V0J-1W0

Ron Tessier
Production Superintendent
(604)697-2201

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Evaluation of grinding media.	4	copper
2. Flotation flowsheet modifications.	6	copper
3. On stream analysis.	6	copper
4. Lime slaker de-gritting.	13	copper

UBC Department of Geological Sciences
6339 Stores Road
Vancouver, British Columbia
V6T-2B4

Harry V. Warren
Honorary Professor
(604)228-3139

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1. Trace elements distribution in British Columbia and epidermiological with cancer.	16	general
2. Trace elements as "Pathfinders" for precious and base metal mineral deposits. R.L. Chase	16	gold
3. Deep sea hydrothermal polymetallic sulfide deposits. W.K. Fletcher & P.Paopongs (604)228-2392	16	general
4. Dispersion of gold in stream sediments, Thailand. W.K. Fletcher & S. Sibbick (604)228-2392	16	gold
5. Exploration geochemistry behaviour and dispersion of gold in glacial till and soils, nickel plate mine. A.J. Sinclair	16	gold
6. Mass balance in element exchange during woodrock alteration. W.K. Fletcher & S. Cook (604)228-2392	16	general
7. Exploration geochemistry, landscape geochemistry of platinum and associated elements in surficial materials.	16	gold

cont.

PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
8. Exploration geochemistry, transport of gold in drainage sediments in relation to design and interpretation of exploration A.J. Sinclair	16	gold
9. Metal distribution patterns and multielement geochemistry, golden sunlight deposit, Montana.	16	gold

BC Research Corporation
3650 Westbrook Mall
Vancouver, British Columbia

R.J. Vos
Research Technologist
(604)224-4331

	PROJECT TITLE TITRE DU PROJET	CATEGORY CATÉGORIE	COMMODITY MATÉRIEL
1.	Biological tank leaching of refractory gold ore.	10	gold
2.	Biological heap leaching of refractory gold ore.	10	gold
3.	Abrasion, garnet beneficiation.	8	ind. min.

SECTION II - Projects Listed by Categories

SECTION II - Liste des projets par catégorie

MINERAL PROCESSING INDEX CATEGORIES

1. **MILL ADMINISTRATION:** includes manpower training and development, safety, management organization, data communication, mill maintenance systems, labour relations, consumable and parts inventory, accounting, daily performance reporting.

2. **MILL FEASIBILITY:** includes economic studies, evaluations, cost estimates and other projects undertaken to determine the potential success of major capital expenditures to develop a new mill, rehabilitate or expand an existing mill.

3. **CRUSHING:** includes wet and dry comminution by gyratory, jaw, cone, impact, roller, impact and compaction mills.

4. **GRINDING:** includes wet and dry steel, autogenous and semiautogenous, pebble mills, attrition mills, fine particle grinding such as pulverizers, jet mills, grinding aids, grinding media, liners, mill construction.

5. **SIZING:** includes wet and dry particle sizing using screens, cyclones, classifiers, hydrosizers, aspirators, trommels.

6. **FLOTATION:** includes investigations in flotation equipment, concentrate grade/recoveries, reagent development, bench, pilot and plant flowsheet testing and modification.

7. **MAGNETIC SEPARATION:** includes high and low intensity wet and dry separation.

8. **GRAVITY & HEAVY MEDIA SEPARATION:** includes use of reagents, media and equipment such as sluices, jigs, centrifuges, and heavy media separators such as drums and cones.

9 **OTHER SEPARATION:** includes sorting, electrostatic, electronic, and other miscellaneous separation techniques.

10. **LEACHING/SOLUTION PURIFICATION/PRECIPITATION:** by heap leaching or conventional techniques, solvent extraction/ion exchange, carbon absorption, precipitation, electrolysis, refining (precious metals).

11. **LIQUID SOLID SEPARATION:** includes thickening, filtration, clarification.

12. **DRYING/CALCINING/PELLETIZING:** includes use of binders, blenders, pelletizing discs, dust collection, fluid bed, flash and rotory dryers, and other types of drying and heat-treatment processes and equipment.

13. ***MATERIAL HANDLING:*** *includes the movement of wet and dry material through bins, pipes, conveyors, elevators, feeders, chutes, bagging machines, pelletizing, concentrate handling and storage.*

14. ***PROCESS CONTROL:*** *includes development of primary sensors, automatic control systems, computer control, expert systems, modelling.*

15. ***TAILINGS AND WASTE MANAGEMENT:*** *includes backfill preparation, tailings treatment and control, waer recycle, construction, slurry transportation, etc.*

16. ***OTHER:*** *this category is reserved for R&D work not adequately covered by the previous categories.*

CATEGORIES DU REPERTOIRE DE PROJETS SUR LE TRAITEMENT DES MINERAUX

1. ADMINISTRATION DE L'USINE: comprend la formation et le perfectionnement de la main-d'oeuvre, la sécurité, l'organisation de la gestion, la communication des données, les systèmes d'entretien de l'usine, les relations de travail, l'inventaire des produits consommables et des pièces, la comptabilité, le rapport de rendement quotidien.

2. FAISABILITE DE L'USINE: comprend des analyses économiques, des évaluations, des estimations de coûts et d'autres études ayant pour objet de déterminer comment d'importantes dépenses en capital peuvent permettre concrètement d'établir une nouvelle usine, de remettre en état une usine existante ou de l'agrandir.

3. CONCASSAGE: comprend la fragmentation par voie humide et par voie sèche, au moyen d'un concasseur giratoire, d'un concasseur à mâchoire, d'un broyeur conique, d'un broyeur à percussion, d'un moulin à cylindres, d'un broyeur-compacteur.

4. BROYAGE: comprend le broyage à tige et à boulet par voie humide et par voie sèche, l'autobroyage et le broyage semi-autogène, les broyeurs à galets, les broyeurs par attrition, les broyeurs de particules fines tels que les pulvérisateurs, les broyeurs à tuyère, les agents de mouture, les corps broyants, les bandes de garnissage, la construction de broyeurs.

5. CLASSEMENT: comprend le classement des particules par voie sèche et par voie humide au moyen de cribles, de cyclones, de classificateurs, d'hydroclasseurs, d'aspirateurs, de trommels.

6. FLOTTATION: comprend des études du matériel de flottation, la teneur/récupération de concentrés, l'élaboration de réactifs, les essais et la modification de schémas de traitement dans le laboratoire, à l'échelle pilote et dans l'usine.

7. SEPARATION MAGNETIQUE: comprend la séparation en milieu humide et à sec à haute et à basse intensité.

8. SEPARATION PAR GRAVITE ET EN MILIEU DENSE: comprend l'utilisation de milieux denses et d'installations telles que des sluices, des bacs à pistonnage, des centrifugeuses et des séparateurs en milieu dense comme des tambours et des cônes.

9. AUTRES TECHNIQUES DE SEPARATION: comprend le triage, la séparation électrostatique, la séparation électronique et d'autres techniques de séparation.

10. ***LIXIVIATION/PURIFICATION DES SOLUTIONS/PRECIPITATION:*** *par lixiviation en tas ou au moyen de techniques classiques, extraction par solvant/échange d'ions, absorption du carbone, précipitation, électrolyse, raffinage (métaux précieux).*

11. ***SEPARATION LIQUIDE-SOLIDE:*** *comprend l'épaississement, la filtration, la clarification.*

12 ***SECHAGE/CALCINATION/BOULETAGE:*** *comprend l'utilisation de liants, de malaxeurs, de disques de bouletage, de capteurs de poussières, de sécheurs en lit fluidisé-flash-rotatifs et d'autres procédés et matériel de séchage et de traitement thermique.*

13. ***MANUTENTION DES MATERIAUX:*** *comprend le transport des matériaux secs et humides qui passent dans des réservoirs, des canalisations, des convoyeurs, des ascenseurs, des alimentateurs, des couloirs et des machines d'enséchage le bouletage et la manutention et l'entreposage de concentrés.*

14. ***CONTROLE DES PROCEDES:*** *comprend la mise au point de capteurs primaires, les systèmes de commande automatique, la commande par ordinateur, les systèmes-experts, la modélisation.*

15. ***GESTION DES RESIDUS ET DES DECHETS:*** *comprend la préparation de remblais, le traitement et le contrôle des résidus, le recyclage de l'eau, la construction, le transport des bouillies, etc.*

16. ***AUTRES:*** *cette catégorie est réservée au travail de R-D qui ne figure pas dans les catégories précédentes.*

1. MILL ADMINISTRATION / ADMINISTRATION de L'USINE

PROJECT TITLE TITRE DU PROJET	COMMODITY MATÉRIEL	PAGE. ITEM
1. Computerized planned maintenance.	coal	4.2
2. Preparation plant recovery performance indicator.	coal	5.7

2. MILL FEASIBILITY / FAISABILITÉ de L'USINE

PROJECT TITLE TITRE DU PROJET	COMMODITY MATÉRIEL	PAGE.ITEM
1. Mineralogical evaluation of ores.	general	19.1
2. Namew Lake mill, new Cu, Ni mine and mill.	nickel, Cu	43.1
3. Flin Flon mill modernization, flotation circuit.	Zn,Cu,Au	43.4
4. Trout Lake ore metallurgy.	Zn,Cu,Au	43.5
5. Wemco 300 cells for Mout Lake copper circuit.	copper, zinc	44.11
6. New circuit (Callinan ore).	copper, zinc	44.12
7. Slag cleaning study - electric furnace.	general	45.4
8. Feasibility study -chromite sensitivity analysis.	general	45.6

3. CRUSHING / CONCASSAGE

PROJECT TITLE TITRE DU PROJET	COMMODITY MATÉRIEL	PAGE.ITEM
1. Substitution of jaw crusher by rock breaker.	copper/zinc	8.1
2. New grinding technology.	general	14.4
3. Nouveau dépoussiereur.	graphite	26.1
4. Recouvrir tous les convoyeurs.	graphite	26.2
5. Crusher automation.	Zn,Cu,Au	43.3

4. GRINDING / BROYAGE

PROJECT TITLE TITRE DU PROJET	COMMODITY MATÉRIEL	PAGE.ITEM
1. Application of SPC in coal preparation.	coal	4.1
2. Low S.G. separation in H.M. cyclones.	coal	4.3
3. Acoustic control of SAG mill operation.	copper, zinc	9.4
4. Effect of grinding media shape and composition on grinding efficiency.	copper, zinc	9.6
5. Optimisation de la récupération de l'or et de l'argent d'une nouvelle zone de minerai réfractaire.	l'or, argent	10.1
6. New grinding technology.	general	14.4
7. Refactory gold recovery.	gold	14.10
8. To improve iron ore recovery at the Scully Mine, Phase IV.	iron	16.1
9. Toxic stabilization and precious metals recovery from process by products and residues at Nerco Con.	gold	16.2
10. Gold recovery improvement investigation at Giant Yellowknife.	gold	16.3
11. Mineralogical analysis of the Faro plant.	copper, zinc	18.2
12. Mineralogical evaluation of ores.	general	19.1
13. Correlation of mineral liberation to ore characteristics and grinding methods.	general	19.2
14. Identification of technology for use by the industrial mineral industry to reduce energy consumption.	ind. min.	23.1
15. Gold mill flowsheet development.	gold	32.4
16. Grinding improvements.	Cu, Zn	32.6
17. Smelter CL slag milling.	Cu, Zn	33.2

PROJECT TITLE TITRE DU PROJET	COMMODITY MATÉRIEL	PAGE.ITEM
18. Optimisation du circuit de broyage.	l'or, cuivre	41.1
19. Flash cell installation on Callinan ore.	copper, zinc	43.9
20. Grinding circuit optimization.	gold	55.6
21. Metallurgical accounting computerization.	gold	55.7
22. Grinding, classification modelling.	lead/zinc	57.4
23. Grinding circuit study.	lead, zinc	60.2
24. Evaluation of grinding media.	copper	61.1

5. SIZING / CALIBRAGE

PROJECT TITLE TITRE DU PROJET	COMMODITY MATÉRIEL	PAGE.ITEM
1. Application of SPC in coal preparation.	coal	4.1
2. Low S.G. separation in H.M. cyclones.	coal	4.3
3. Replacement of rods on rod deck screens by rubber panels.	copper/zinc	8.2
4. Mineralogical evaluation of ores.	general	19.1
5. Identification of technology for use by the industrial mineral industry to reduce energy consumption.	ind. min.	23.1
6. Installation de tamis dillion.	graphite	26.3
7. Kidd ore evaluations.	Cu, Zn	32.11
8. Circuit performance evaluations.	Cu, Zn	32.12
9. Cleaning drilling muds with hydrocyclones.	coal	52.2
10. Secondary fines dewatering sieve bends.	coal	56.1
11. Coal characterization - cleaning potential.	coal	59.5
12. Grinding circuit study.	lead, zinc	60.2

6. FLOTATION / FLOTTATION

PROJECT TITLE TITRE DU PROJET	COMMODITY MATÉRIEL	PAGE. ITEM
1. Colonne de flottation.	cuivre, zinc	3.2
2. Analyseur en continu.	cuivre, zinc	3.3
3. Application of SPC in coal preparation.	coal	4.1
4. Flotation column testwork.	copper, zinc	9.1
5. Fotation froth washing.	copper, zinc	9.2
6. Cu-Zn separation with secondary Cu minerals.	copper, zinc	9.3
7. ORP as a control variable for Cu-Zn separation.	copper, zinc	9.5
8. Optimisation de la récupération de l'or et de l'argent d'une nouvelle zone de minerai réfractaire.	l'or, argent	10.1
9. Column flotation, mixing.	general	12.1
10. Column flotation, bias measurement.	general	12.2
11. Column flotation, gas holdup measurement.	general	12.3
12. Column flotation, control.	general	12.4
13. Column flotation, basics.	general	12.5
14. Electrochemistry, basics.	general	12.6
15. Electrochemisry, use of N .	general	12.7
16. Electrochemistry, probe development.	general	12.8
17. Electrochemistry, collectorless flotation	general	13.1
18. Water recycle, effects	general	13.2
19. Magnetic - magnetic hydrocyclones column flotation level.	general	13.3
20. Mineral process development.	general	14.5
21. Development of small scale continuous flotation cell.	general	14.6

PROJECT TITLE TITRE DU PROJET	COMMODITY MATÉRIEL	PAGE.ITEM
22. Column flotation.	general	14.7
23. New flotation technology.	general	14.8
24. Water chemistry effects on flotation.	general	14.9
25. Column flotation CANMET-Industry R&D (CANMET).	general	15.3
26. Toxic stabilization and precious metals recovery from process by products and residues at Nerco Con.	gold	16.2
27. Gold recovery improvement investigation at Giant Yellowknife.	gold	16.3
28. Mineralogical analysis of the Faro plant.	copper, zinc	18.2
29. Image analysis of products from Faro deposit in Yukon.	copper,zinc	18.3
30. Mineralogical evaluation of ores.	general	19.1
31. Correlation of mineral liberation to ore characteristics and grinding methods.	general	19.2
32. Improved recovery technology for the treatment of fine particles (tin).	tin	20.1
33. Optimization of column flotation.	general	21.1
34. Flotation process control.	copper, zinc	24.1
35. Column flotation research Manitoba - MDA program.	copper, zinc	24.2
36. Applications of mineral electrochemistry in mineral processing and environmental control.	general	27.10
37. Copper circuit strategy development.	Cu, Zn	32.1
38. Reagent testing for Zn metallurgy improvements.	Cu, Zn	32.2
39. 'A' ore Cu circuit configuration testing.	Cu, Zn	32.3
40. Gold mill flowsheet development.	gold	32.4

PROJECT TITLE TITRE DU PROJET	COMMODITY MATÉRIEL	PAGE.ITEM
41. Copper flotation selectivity improvements.	Cu, Zn	32.5
42. Lead rejection.	Cu, Zn	32.7
43. Column flotation testing.	Cu, Zn	32.8
44. 'A' Zn concentrate upgrading.	Cu, Zn	32.10
45. Kidd ore evaluations.	Cu, Zn	32.11
46. Circuit performance evaluations.	Cu, Zn	32.12
47. Nitrogen conditioning zinc circuit feed.	Cu, Zn	32.13
48. Flotation NaCN/SO2 control.	Cu, Zn	32.14
49. Smelter CL slag milling.	Cu, Zn	33.2
50. Flotation Ph control.	Cu, Zn	33.3
51. Flotation froths	general	38.1
52. Flotation circuit analysis	general	38.2
53. Aerosol reagent addition	general	38.3
54. Optimisation de la récupération de l'or flottation et par gravité pour l'or libre.	l'or, cuivre	41.2
55. Flash flotation cell.	gold	42.2
56. Flash flotation cell.	gold	43.2
57. Flin Flon mill modernization, flotation circuit.	Zn,Cu,Au	43.4
58. Trout Lake ore metallurgy.	Zn,Cu,Au	43.5
59. Column flotation testing for Cu/Zn separation and Zn Conc upgrading.	copper, zinc	43.7
60. Sala process for the above (hot reverse flotation.)	copper, zinc	43.8
61. Flash cell installation on Callinan ore.	copper, zinc	43.9

PROJECT TITLE TITRE DU PROJET	COMMODITY MATÉRIEL	PAGE. ITEM
62. New circuit (Callinan ore).	copper, zinc	44.12
63. Column flotation - copper concentrates.	general	45.3
64. Electrostatic separation.	potash	47.7
65. Air sparged hydro-cyclone.	coal	49.1
66. Recovery enhancement from leach tails	gold	51.1
67. Column flotation of coal-modelling and scaleup.	coal	52.1
68. Chalcopyrite/sphalerite separation - improved reagent development.	copper/zinc	54.2
69. Treatment of refractory ores.	gold	55.1
70. Recovery of gold from Con Mill tailings.	gold	55.2
71. Treatment of roaster calcine residues.	gold	55.3
72. Column cell research - critical control variables.	lead/zinc	57.1
73. Column cell research - applied mineralogy.	lead/zinc	57.2
74. Column cell research, fine sulphide separation.	lead/zinc	57.3
75. Column cell scale-up.	lead/zinc	57.5
76. Flotation of complex ores.	lead/zinc	57.6
77. Beneficiation of complex, refractory gold ores.	lead/zinc	57.7
78. Column flotation.	lead, zinc	60.1
79. Fine grained lead/zinc.	lead, zinc	60.3
80. Computer system replacement.	lead, zinc	60.5
81. Flotation flowsheet modifications.	copper	61.2
82. On stream analysis.	copper	61.3

7. MAGNETIC SEPARATION / SÉPARATION MAGNETIQUE

PROJECT TITLE TITRE DU PROJET	COMMODITY MATÉRIEL	PAGE.ITEM
1. Grade control.	iron ore	6.1
2. Iron recovery.	iron ore	6.2
3. Magnetic - magnetic hydrocyclones column flotation level.	general	13.3
4. Mineralogical evaluation of ores.	general	19.1
5. Studies related to the potash industry -dry magnetic and heavy media separation, tailings management & degradation in transit.	potash	23.5
6. Dry magnetic separation.	potash	47.2

8. GRAVITY, HEAVY MEDIA SEPARATION/SÉPARATION PAR GRAVITÉ, MILIEU DENSE

PROJECT TITLE TITRE DU PROJET	COMMODITY MATÉRIEL	PAGE. ITEM
1. Application of SPC in coal preparation.	coal	4.1
2. Low S.G. separation in H.M. cyclones.	coal	4.3
3. Comparison of channel sample PLY analyses with bulk coal washability.	coal	5.6
4. Regrind of sprial middlings.	iron ore	7.1
5. Optimisation de la récupération de l'or et de l'argent d'une nouvelle zone de minerai réfractaire.	l'or, argent	10.1
6. TriFlo heavy media separation.	general	14.11
7. To improve iron ore recovery at the Scully Mine, Phase IV.	iron	16.1
8. Gold recovery improvement investigation at Giant Yellowknife.	gold	16.3
9. Image analysis study of mill products from the spiral of the Quebec Cartier Mining Company.	iron ore	18.1
10. Mineralogical evaluation of ores.	general	19.1
11. Recovery of fine placer gold from sluice box tails.	gold	21.2
12. Optimization of unit operations used in placer mining.	gold	23.3
13. Studies related to the potash industry -dry magnetic and heavy media separation, tailings management & degradation in transit.	potash	23.5
14. Gold mill flowsheet development.	gold	32.4
15. Evaluation of Knelson concentrator.	Cu, Zn	33.1
16. Optimisation de la récupération de l'or flottation et par gravité pour l'or libre.	l'or, cuivre	41.2
17. Heavy media separation of potash.	potash	47.3

8. GRAVITY, HEAVY MEDIA SEPARATION/SÉPARATION PAR GRAVITÉ, MILIEU DENSE cont.

PROJECT TITLE TITRE DU PROJET	COMMODITY MATÉRIEL	PAGE. ITEM
18. Washery optimization.	coal	53.1
19. Heavy media cyclone circuit expansion.	coal	56.2
20. Beneficiation of complex, refractory gold ores.	lead/zinc	57.7
21. Fine coal technology assessment.	coal	59.2
22. Westcoal separator.	coal	59.3
23. Hydrosizer for fine coal recovery.	coal	59.4
24. Coal characterization - cleaning potential.	coal	59.5
25. Computer system replacement.	lead, zinc	60.5
26. Abrasion, garnet beneficiation.	ind. min.	64.3

9. OTHER SEPARATION / AUTRES TECHNIQUES de SÉPARATION

PROJECT TITLE TITRE DU PROJET	COMMODITY MATÉRIEL	PAGE.ITEM
1. Remblayage hydraulique.	cuivre, zinc	3.1
2. Refactory gold recovery.	gold	14.10
3. Studies related to asbestos - wet milling, characterization of fibres and bore hole analysis	asbestos	23.4
4. Column flotation testing for Cu/Zn separation and Zn Conc upgrading.	copper, zinc	43.7
5. Sala process for the above (hot reverse flotation.)	copper, zinc	43.8
6. Silicon metal production.	silica	45.5
7. WESTCOAL separator.	coal	53.2
8. Fine coal technology assessment.	coal	59.2

10. LEACHING / LIXIVIATION

PROJECT TITLE TITRE DU PROJET	COMMODITY MATÉRIEL	PAGE. ITEM
1. Optimisation de la récupération de l'or et de l'argent d'une nouvelle zone de minerai réfractaire.	l'or, argent	10.1
2. Cyanuration du matérial de remblai.	l'or	11.1
3. Refactory gold recovery.	gold	14.10
4. Toxic stabilization and precious metals recovery from process by products and residues at Nerco Con.	gold	16.2
5. Gold recovery improvement investigation at Giant Yellowknife.	gold	16.3
6. A study on the potential for heap leaching of placer deposits in the Yukon.	gold	23.2
7. Zinc refining technology improvement.	Zinc	27.6
8. Advanced processes for the treatment of gold ores.	gold	27.7
9. Evaluation of chloride metallurgy for complex sulphide ores.	Pb, Zn	27.8
10. Cyanide recovery from gold mill process solutions using AVR.	gold	27.9
11. Applications of mineral electrochemistry in mineral processing and environmental control.	general	27.10
12. Biological removal of metal from dilute solutions.	general	27.11
13. Water pollution control with zero discharge target and focus on sludge disposal.	general	29.1
14. Installation and evaluation of a hydrogen peroxide effluent treatment plant.	gold	30.1
15. Production of a copper/gold concentrate prior to precious metals leaching.	gold	30.3

	PROJECT TITLE TITRE DU PROJET	COMMODITY MATÉRIEL	PAGE.ITEM
16.	Installation and testing of intank screens as a replacement for external screens in CIP circuits.	gold	30.4
17.	Testing resins for the extraction of copper from cyanide solutions.	gold	30.5
18.	Bio-oxidation of refractory gold ores.	gold	34.1
19.	Solution flow in heap leaching	general	38.4
20.	Bioleach pilot plant.	gold	42.1
21.	Bacterial leaching of Flin Flon ore.	Zn,Cu,Au	43.6
22.	Treatment of refractory ores.	gold	55.1
23.	Recovery of gold from Con Mill tailings.	gold	55.2
24.	Treatment of roaster calcine residues.	gold	55.3
25.	Development of methods to recover gold from low grade ores.	gold	55.5
26.	Biological tank leaching of refractory gold ore.	gold	64.1
27.	Biological heap leaching of refractory gold ore.	gold	64.2

11. LIQUID SOLID SEPARATION / SÉPARATION LIQUIDE-SOLIDE

PROJECT TITLE TITRE DU PROJET	COMMODITY MATÉRIEL	PAGE.ITEM
1. Optimization of unit operations used in placer mining.	gold	23.3
2. Installation de nouveau centrifuge.	graphite	26.4
3. Zinc refining technology improvement.	Zinc	27.6
4. Biological removal of metal from dilute solutions.	general	27.11
5. Pressure filter project.	Cu,Pb,Zn	39.1
6. Electrocoagulation.	coal	53.3
7. Fine coal technology assessment.	coal	59.2

12. DRYING / SÉCHAGE

PROJECT TITLE TITRE DU PROJET	COMMODITY MATÉRIEL	PAGE. ITEM
1. Improved moisture reduction for Victoria junction fine clean coal.	coal	5.1
2. Optimization of fine coal dewatering circuit at Victoria Junction coal prep. plant.	coal	5.2
3. Drying of synthetic materials.	coal	59.1
4. Coal stabilization.	coal	59.6
5. Segregation in drying.	coal	59.7

13. MATERIAL HANDLING / MANUTENTION des MATÉRIAUX

PROJECT TITLE TITRE DU PROJET	COMMODITY MATÉRIEL	PAGE.ITEM
1. Freeze - conditioning of coal.	coal	4.4
2. Evaluation of composite of high lime CFBC waste and prep plant coarse waste.	coal	5.4
3. Limitation of pyrite oxidation and acid formation.	coal	5.8
4. Fully automated backfill system.	copper/zinc	8.3
5. Optimization of unit operations used in placer mining.	gold	23.3
6. Studies related to the potash industry -dry magnetic and heavy media separation, tailings management & degradation in transit.	potash	23.5
7. Evaluation of Knelson concentrator.	Cu, Zn	33.1
8. Pressure filter project.	Cu,Pb,Zn	39.1
9. Tailings pipeline replacement.	Cu,Zn	40.1
10. Coal beneficiation process.	coal	53.4
11. Coal agglomeration process development.	coal	53.5
12. Spontaneous combustion of thermally treated coals.	coal	53.6
13. Spontaneous combustion of thermally treated coals.	coal	53.7
14. Agglomeration of coking coal.	coal	53.8
15. Lime slaker de-gritting.	copper	61.4

14. PROCESS CONTROL / CONTROLE des PROCÉDÉS

PROJECT TITLE TITRE DU PROJET	COMMODITY MATÉRIEL	PAGE.ITEM
1. Remblayage hydraulique.	cuivre, zinc	3.1
2. Analyseur en continu.	cuivre, zinc	3.3
3. Application of SPC in coal preparation.	coal	4.1
4. Grade control.	iron ore	6.1
5. Mill grind control.	iron ore	7.2
6. Tailings line velocity control.	iron ore	7.3
7. Column flotation, bias measurement.	general	12.2
8. Column flotation, gas holdup measurement.	general	12.3
9. Column flotation, control.	general	12.4
10. Electrochemistry, probe development.	general	12.8
11. Magnetic - magnetic hydrocyclones column flotation level.	general	13.3
12. Instrumentation for milling operations.	general	14.1
13. Advanced process control and modelling.	general	14.2
14. Expert systems.	general	14.3
15. Implementation of process control systems in mineral concentrator	gold	15.1
16. Knowledge-based automatic control in processing plants (Laval).	general	15.2
17. Iron ore producers real time investigations (CANMET).	iron/ore	15.5
18. To improve iron ore recovery at the Scully Mine, Phase IV.	iron	16.1
19. Pyrometallurgical CRM's for sulphur.	sulphur	22.1
20. Identification of technology for use by the industrial mineral industry to reduce energy consumption.	ind. min.	23.1

PROJECT TITLE TITRE DU PROJET	COMMODITY MATÉRIEL	PAGE.ITEM
21. Copper refining technology enhancement.	Copper	27.5
22. Advanced processes for the treatment of gold ores.	gold	27.7
23. Evaluation of chloride metallurgy for complex sulphide ores.	Pb, Zn	27.8
24. Applications of mineral electrochemistry in mineral processing and environmental control.	general	27.10
25. Testing of a Cyanostat for measurement of cyanide quantities in gold/silver leaching solutions.	gold	30.2
26. Copper circuit strategy development.	Cu, Zn	32.1
27. Grinding improvements.	Cu, Zn	32.6
28. Concentrator X-ray expert system.	Cu, Zn	32.9
29. Flotation NaCN/SO2 control.	Cu, Zn	32.14
30. Modernization of ARL analyzer and associated computer system.	copper, zinc	43.10
31. Auto-sampler assessment.	coal	59.8
32. Column flotation.	lead, zinc	60.1
33. X-ray analysis.	lead, zinc	60.4
34. Computer system replacement.	lead, zinc	60.5

15. TAILINGS / RÉSIDUS

PROJECT TITLE TITRE DU PROJET	COMMODITY MATÉRIEL	PAGE.ITEM
1. Remblayage hydraulique.	cuivre, zinc	3.1
2. Limitation of pyrite oxidation and acid formation.	coal	5.8
3. Water chemistry effects on flotation.	general	14.9
4. Toxic stabilization and precious metals recovery from process by products and residues at Nerco Con.	gold	16.2
5. Gold recovery improvement investigation at Giant Yellowknife.	gold	16.3
6. Mineralogical evaluation of ores.	general	19.1
7. Optimization of unit operations used in placer mining.	gold	23.3
8. Studies related to the potash industry -dry magnetic and heavy media separation, tailings management & degradation in transit.	potash	23.5
9. Preparation of a manual on the disposal of tailings from uranium mining operations.	uranium	23.6
10. Zinc refining technology improvement.	Zinc	27.6
11. Advanced processes for the treatment of gold ores.	gold	27.7
12. Evaluation of chloride metallurgy for complex sulphide ores.	Pb, Zn	27.8
13. Applications of mineral electrochemistry in mineral processing and environmental control.	general	27.10
14. Biological removal of metal from dilute solutions.	general	27.11
15. Biological treatment of acid mine drainage.	general	27.12
16. Biological treatment of industrial effluents for control of metals and organics.	general	28.13

PROJECT TITLE TITRE DU PROJET	COMMODITY MATÉRIEL	PAGE.ITEM
17. Mine environment neutral drainage (MEND).	general	28.14
18. Agglomeration of fine mill tailings for back-fill	general	31.2
19. Smelter CL slag milling.	Cu, Zn	33.2
20. Gold mining effluent treatment.	gold	35.1
21. Treatment of aqueous effluent from in-situ bitumen heavy oil recovery.	oil	35.2
22. Ecological engineering methods for acid mine drainage treatment of coal wastes	general	36.1
23. Field evaluation of tailings abandonment techniques.	general	37.1
24. The geochemical evolution of the Delnite Mine tailings.	silver	37.2
25. The geochemical evolution of the Heath Steele Mine tailings.	copper, zinc	37.3
26. The geochemistry of the Vadose Zone of the Waite Amulet tailings impoundment, Quebec.	copper,zinc	37.4
27. The hydrogeology and geochemistry of the Inco Copper Cliff tailings.	Cu, Ni	37.5
28. Tailings pipeline replacement.	Cu,Zn	40.1
29. Abandoned sulphide tailings study.	general	45.1
30. Peat treatment - acid effluent.	general	45.2
31. Gold recovery bromide process on mill tailings.	gold	45.7
32. Long term tails management.	potash	47.1
33. Dissolution/injection of potash tailings.	potash	47.4
34. Recovery of gold from Con Mill tailings.	gold	55.2
35. Reprocessing of mill tailings.	gold,silver	58.1

PROJECT TITLE TITRE DU PROJET	COMMODITY MATÉRIEL	PAGE. ITEM
36. Fine coal technology assessment.	coal	59.2

16. OTHER / DIVERS

PROJECT TITLE TITRE DU PROJET	COMMODITY MATÉRIEL	PAGE. ITEM
1. The hydrological study of a large coal stockpile.	coal	5.3
2. Evaluation of composite of high lime CFBC waste and prep plant coarse waste.	coal	5.4
3. Suitability of N.S. coals as feed for Shell, Texaco, BGC Lurgi and KRW Gasifiers.	coal	5.5
4. Limitation of pyrite oxidation and acid formation.	coal	5.8
5. Modification of ash fusion temperature.	coal	5.9
6. Activated carbon losses of carbon in pulp circuits (Queen's).	gold	15.4
7. Toxic stabilization and precious metals recovery from process by products and residues at Nerco Con.	gold	16.2
8. Gold recovery improvement investigation at Giant Yellowknife.	gold	16.3
9. Summary reports, industrial minerals.	ind. mineral	17.1
10. Pyrometallurgical CRM's for sulphur.	sulphur	22.1
11. Studies related to asbestos - wet milling, characterization of fibres and bore hole analysis	asbestos	23.4
12. Production of barium chemicals from barite.	barite	23.7
13. Development of a method for predicting concentrator performance from characteristics of blast hole cuttings.	iron ore	23.8
14. Lignosulphonates as depressants in the ore flotation process.	general	25.1
15. Lignosulphonates as binders for iron ore pelletization.	iron ore	25.2

	PROJECT TITLE TITRE DU PROJET	COMMODITY MATÉRIEL	PAGE. ITEM
16.	Air pollution control-monitoring and control of noxious elements in pyrometallurgical processes.	general	27.1
17.	Non-ferrous smelter technology/development and implementation of improved technology.	general	27.2
18.	Characterization of SO_2 sorbents in fluid bed combustion.	general	27.3
19.	Sensor development for pyrometallurgical processes.	general	27.4
20.	Copper refining technology enhancement.	Copper	27.5
21.	Zinc refining technology improvement.	Zinc	27.6
22.	Advanced processes for the treatment of gold ores.	gold	27.7
23.	Evaluation of chloride metallurgy for complex sulphide ores.	Pb, Zn	27.8
24.	Biological removal of metal from dilute solutions.	general	27.11
25.	Biological treatment of industrial effluents for control of metals and organics.	general	28.13
26.	Installation and use of an induction furnace to refine steel wool cathodes.	10	30.6
27.	Fundamental reserch - electrokinetic phenomena	general	31.1
28.	Agglomeration of fine mill tailings for backfill	general	31.2
29.	Concentrator X-ray expert system.	Cu, Zn	32.9
30.	Flotation NaCN/SO2 control.	Cu, Zn	32.14
31.	Flotation Ph control.	Cu, Zn	33.3
32.	Ecological engineering measures developed for acid generating waste the close-out of a decant pond	general	36.2

PROJECT TITLE TITRE DU PROJET	COMMODITY MATÉRIEL	PAGE.ITEM
33. Biological polishing of mining waste waters: Bioaccumulation by the Characeae	general	36.3
34. Trout Lake ore metallurgy.	Zn,Cu,Au	43.5
35. Wemco 300 cells for Mout Lake copper circuit.	copper, zinc	44.11
36. New circuit (Callinan ore).	copper, zinc	44.12
37. Molybdenum removal circuit (Removal of molybdenum uranium bearing loaded strip solutions.)	uranium	46.1
38. Ion exchange technology.	potash	47.5
39. Potash product compaction.	potash	47.6
40. Ion chromatograph applications.	potash	47.8
41. Mill commissioning systems.	general	48.1
42. Recovery improvements.	gold	50.1
43. Co-agglomeration of sulphur adsorbents on coke.	coal	52.3
44. Coal beneficiation process.	coal	53.4
45. Coal agglomeration process development.	coal	53.5
46. Spontaneous combustion of thermally treated coals.	coal	53.6
47. Spontaneous combustion of thermally treated coals.	coal	53.7
48. Agglomeration of coking coal.	coal	53.8
49. Refractory gold recovery - modified roasting techniques.	gold	54.1
50. Treatment of refractory ores.	gold	55.1
51. Treatment of roaster calcine residues.	gold	55.3
52. Arsenic-bearing sludge stabilization.	gold	55.4

PROJECT TITLE TITRE DU PROJET	COMMODITY MATÉRIEL	PAGE.ITEM
53. Development of methods to recover gold from low grade ores.	gold	55.5
54. Neutralization of acid mine drainage by tube-milling of limestone.	gold,silver	58.2
55. Coal stabilization.	coal	59.6
56. Coal beneficiation process.	coal	59.9
57. X-ray analysis.	lead, zinc	60.4
58. Trace elements distribution in British Columbia and epidermiological with cancer.	general	62.1
59. Trace elements as "Pathfinders" for precious and base metal mineral deposits.	gold	62.2
60. Deep sea hydrothermal polymetallic sulfide deposits.	general	62.3
61. Dispersion of gold in stream sediments, Thailand.	gold	62.4
62. Exploration geochemistry behaviour and dispersion of gold in glacial till and soils, nickel plate mine.	gold	62.5
63. Mass balance in element exchange during woodrock alteration.	general	62.6
64. Exploration geochemistry, landscape geochemistry of platinum and associated elements in surficial materials.	gold	62.7
65. Exploration geochemistry, transport of gold in drainage sediments in relation to design and interpretation of exploration	gold	63.8
66. Metal distribution patterns and multielement geochemistry, golden sunlight deposit, Montana.	gold	63.9